DOCUMENT RESUME

ED 251 306 SE 045 256

TITLE	Hunting and Wildlife Management. Issue Pac.
INSTITUTION	Fish and Wildlife Service (Dept. of Interior), Washington, D.C.; National Inst. for Urban Wildlife, Columbia, MD.
PUB DATE	84
NOTE	32p.; Poster has been removed due to size. Will be available in original packet from N.I.U.W.
AVAILABLE FROM	National Institute for Urban Wildlife, 10921 Trotting Ridge Way, Columbia, MD 21044 ($5.00).
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Animals; *Environmental Education; Environmental Influences; Federal Legislation; Intermediate Grades; Junior High Schools; *Learning Activities; Outdoor Activities; *Wildlife; *Wildlife Management
IDENTIFIERS	*Hunting

ABSTRACT

The materials in this educational packet are designed for use with students in grades 4 through 7. They consist of an overview, three lesson plans, student data sheets, and a poster. The overview discusses hunting as a tool for wildlife management, the management of wildlife populations and hunter participation in providing research data, and the economic aspects of hunting. A glossary and list of reference materials are included. The lesson plans provide a list of learning outcomes, instructional strategies, a list of materials needed, and an activity review sheet. Lesson activities include: (1) investigating the capture/recapture method of estimating animal populations; (2) playing a game which shows how wildlife populations fluctuate in response to environmental factors; and (3) taking part in a deer management exercise. The two-sided poster shows a collage of hunting scenes from prehistoric times to the present (side 1) and a series of graphs and charts illustrating the contributions hunters have made to conservation through the years (side 2). A student fact sheet on the Federal Aid in Wildlife Restoration Act (the Pittman-Robertson Program) is also provided. (JN)

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Hunting and Wildlife Management

Issue Pac

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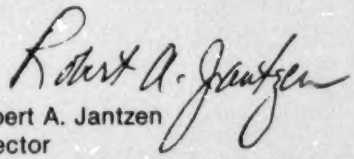
A Message To Educators

The Fish and Wildlife Service manages millions of acres of land, conducts wildlife research, raises fish for restocking depleted waters, and performs hundreds of other tasks designed to benefit fish and wildlife resources. However, as important as these activities are, we realize that in the long run an informed, motivated, and involved public can do more to benefit wildlife than all of our management activities.

This education package represents an important step in our efforts to provide teachers and other educators with factual information about wildlife, habitat, and resource management. We hope that you find these materials useful and that you will encourage your students to learn more about America's wildlife heritage.



Robert A. Jantzen
Director
U.S. Fish and Wildlife Service

These materials are designed for use with students in grades four through seven.

Contents

Leader Overview
The Overview examines hunting as a tool for wildlife management. The management of wildlife populations and hunter participation in providing research data are discussed. The economic aspects of hunting are also explored. Boldfaced words are defined in the Glossary and reference materials are listed under Resources.

Poster: Side 1
The poster is a collage of hunting scenes from prehistoric times to the present.

Poster: Side 2
A series of graphs and charts show the contributions hunters have made to conservation through the years.

Student Page 1: Braised Rabbit
A tasty meal can result from a hunting trip, just as it did in pioneer days.

Student Page 2: Build a Duck
Students will make a duck decoy out of papier mache to learn some of the history and tradition associated with waterfowl hunting.

Activity 1: "Tagging" Wildlife
This Activity introduces students to the capture/recapture method of estimating population and to the concept of tagging animals to collect information about them. Through a game of tag, students will learn:
- The importance of accurate data collection in wildlife management;
- The type of information that can be obtained by tagging or marking animals; and
- The relation between hunting and wildlife data collection.

Activity 2: Habitat Game
Students will participate in a game which shows how wildlife populations fluctuate in response to factors such as food, water, and cover. Students will learn:
- What environmental factors are needed by wildlife to survive; and
- The role predators (including humans) play in a natural ecosystem.

Activity 3: Deer Management
In some cases, active management of species is necessary. In this Activity, students will be exposed to a variety of factors influencing management decisions. Students will learn:
- How wildlife management depends on a variety of tools and conditions;
- The cost/benefit impacts of various management strategies; and
- The role of hunting in management of a wildlife species.

Hunting and Wildlife Management

Leader Overview

Introduction

Hunting has long played an important role in American history. American Indians relied on hunting for food, clothing, and religious objects. Frontier settlers, too, depended on game to provide them with needed meat and furs. The availability of wildlife and the freedom to use it greatly influenced the character of the pioneer. Hunting to put food on the table is still important today. For many Alaskans, it continues to be an integral part of their culture. However, if you were to ask today's hunters why they hunt, "for food" would be only one of many reasons given.

This Pac doesn't attempt to analyze the many reasons why people hunt. Instead, the relationship between hunting and **wildlife management** is explored. Hunting is only one of many techniques used in modern wildlife management, but it is an important one. Hunters help regulate **wildlife populations.** They assist in wildlife research efforts, and their dollars help fund wildlife management programs.

Hunting in pioneer days

Wildlife Management

Wild animal populations, particularly of deer, squirrel, pheasant, grouse, quail, and other common game, normally produce more young each year than can be supported by their **habitat.** The maximum ability of a habitat to provide sufficient food, **cover**, and water for a species is its **carrying capacity**. The carrying capacity of most habitats is greatest in late summer and fall and lowest in late winter and early spring. With lush vegetation growth in spring and summer, wildlife produce their young, and by fall there will be too many individuals to survive the winter. A high proportion of the summer wildlife population, about 60 percent for ground-nesting birds like quail, grouse, and wild turkey, will not survive to reproduce the following spring. They die for many reasons, but the cold, wet winter provides the stress that makes individuals vulnerable to disease and hypothermia (abnormally low body temperature). Larger animals, particularly deer, may survive one or more winters even though food is scarce. Over the long run, however, disease and starvation will bring the deer herd back into balance with the habitat (food, water, and cover) available. The **wildlife manager** recognizes that the use of **recreational hunting** to adjust wildlife population size to the winter carrying capacity of the habitat is an important management tool. The result is a healthy, stable wildlife population as well as recreation and food for the hunter.

At times, however, not enough wildlife is left to reproduce and maintain populations. Commercial exploitation in the past may have been one factor in the serious depletion or extinction of some species. The desire for decorative feathers contributed to the decline of some species of birds such as the egret. Excesses such as these, plus loss of natural habitat, have caused sport hunters and other conservationists to push for Federal and State governments to take strong actions to perpetuate wildlife. Because of their efforts, many wildlife refuges were established; **bag limits,** hunting seasons, and conservation laws were enacted; and a high priority was given to wildlife management

based on scientific analysis and research.

Hunting and Wildlife Research

Information on animal abundance (populations), habitat, and hunting pressures is needed before wildlife managers can effectively manage wildlife. Hunters cooperate with managers by bringing their game animals to **check stations,** reporting banded or tagged animals, and filling out detailed questionnaires. At game check stations, wildlife biologists inspect the animals to determine general health, age, sex, and physical characteristics. Samples of blood or other tissues may be taken for evidence of disease, parasitism, and other maladies. Teeth and jaws may be collected from deer, elk, and bear to determine age. In the case of waterfowl, wings may be collected to determine age and sex. In addition, the wings can be analyzed for signs of pesticide and other contamination.

Hunters also supply important information by reporting banded or tagged animals. A duck banded in Minnesota one fall may be taken in Texas several years later. The band sent in by the hunter provides scientists with one more small piece of data. This, added to other hunter returned bands, reveals major facts about bird populations, life expectancy, and migration. It is largely because of hunter cooperation that so much is known about the migration and population dynamics of North American ducks and geese.

The number of animals in a population is an important consideration in wildlife management. Aerial surveys of waterfowl and of large mammals such as elk are frequently used in **population estimating** efforts. Other projects may use banding or tagging to determine population trends. For instance, over a period of several months a biologist trapped, tagged, and released a large number of swamp rabbits in Missouri. As he continued to "run" his trap line, some of the tagged animals were recaptured. By using a simple **capture/recapture** formula, he estimated the number of rabbits in the area. This information, plus a survey of available habitat, was used to develop management and hunting options. Similar information is obtained by banding ducks and geese. Bands returned by hunters and hunter success reports are used to calculate population levels and to set bag limits and seasons.

Hunters also fill out questionnaires and report forms. Number of hours hunted, location of the hunt, number of animals seen, and number and sex of animals harvested, are analyzed by wildlife managers to develop management plans and recommend seasons and bag limits. Economists analyze the forms to estimate the economic impact of hunting.

Hunting and Economics

In addition to the support that hunters have given to the conservation movement, they have also contributed substantial amounts of money to wildlife management through the years. Since 1937, a Federal excise tax on rifles, handguns, shotguns, ammunition, and archery equipment has produced more than one billion dollars. Since the Federal and State governments share responsibilities in wildlife management, these tax monies are returned to the States. They are used for wildlife research, land purchases, hunter safety programs, and habitat improvement. In addition, hunting

Hunters help provide much information about waterfowl.

license fees fund most State wildlife management programs. The purchase of **"Duck Stamps"** by waterfowl hunters has resulted in the Federal purchase and management of over 2.3 million acres of prime wildlife habitat since the "Duck Stamp Program" was started in 1934. Many States also have "Duck Stamp" programs.

Although hunters provide these funds, their use produces wide benefits for all species of wildlife, most of which are not hunted. When a wildlife agency uses money contributed by hunters in the form of taxes and licenses to build a pond primarily to improve duck habitat, fish, turtles, and a variety of other wildlife will be more abundant. Environmentalists, non-hunters, bird-watchers, hunters, and anglers may all enjoy the new pond.

Hunting and Population Management

If you were to keep track of the deer population in an area over a long period, you would see that their numbers fluctuate from year to year. Food, cover, disease, predators, and weather influence the size of the deer population at any given time. However, given relatively natural conditions, the ups and downs balance out over the long term so that the number of deer in an area is fairly constant. The key phrase here is "under natural conditions." A look at the history of the Pennsylvania deer herd provides a good example of what sometimes happens when natural conditions are altered.

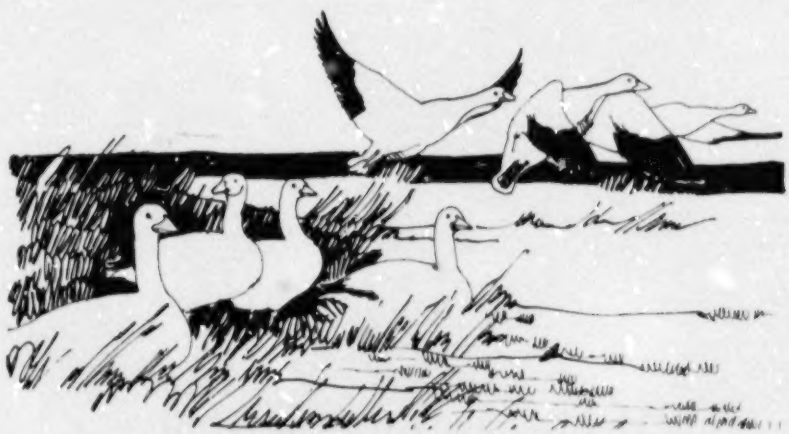
In the late 1800s, thousands of acres of Pennsylvania farmland were allowed to revert to brush and forests—prime deer habitat. Because of good weather and improving habitat, the deer herd outgrew the available food supply and exceeded the habitat's carrying capacity. Limited hunting of only male deer could not keep

the population in check. Thousands of deer died from starvation and disease. The habitat was severely damaged as deer **overbrowsed** to find enough food. Eventually disease and starvation reduced the size of the weakened herd drastically. But because large areas of favorable habitat had been created, the potential was there for recurring cycles of population explosion and crash.

A variety of ways could have been used to stabilize the deer population. Deer could have been trapped and moved elsewhere—an expensive proposition considering the number of deer involved. Food could have been provided to prevent starvation—also expensive and only a short-term solution. However, the most efficient and economical solution was to allow hunters to harvest the surplus deer—both bucks and does. Today, this is the key element in maintaining stable, healthy deer herds in Pennsylvania and in many other States.

This example points out one of the most important aspects of hunting and wildlife management: hunting gives wildlife management agencies a low-cost, efficient tool for stabilizing the size of deer, elk, and pronghorn populations within the carrying capacity of their habitats.

Sometimes distribution patterns and local concentrations of wildlife populations are more of a problem than overpopulation. The planting of wheat and other grain crops in the upper Midwest provided a new food source for migrating geese. These geese sometimes cause considerable crop



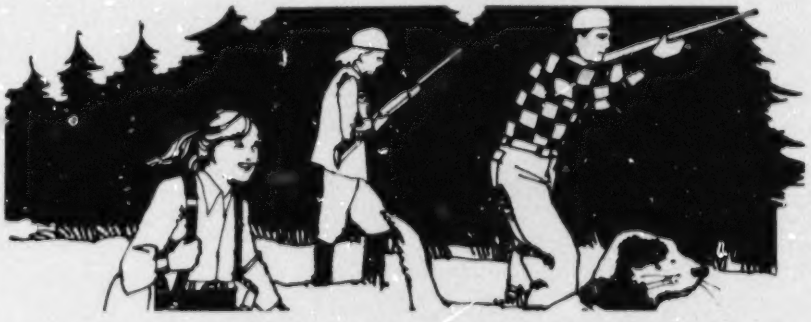
damage when they feed. Hunting is used to disperse the birds and encourage them to continue migrating south rather than feeding for extended periods in the farmers' fields. In Colorado hunting was used to reduce the spread of parasites among bighorn sheep. The hunted sheep dispersed over greater areas and used new habitats thereby reducing overcrowding and the spread of disease.

Summary

Hunting is only one of many effective tools used in wildlife management. Law enforcement, habitat conservation, research, and education programs are important, too. Hunting is unique, however. It provides necessary funding for wildlife management efforts, is useful in wildlife research, and is an effective, low-cost method for controlling certain wildlife populations. At the same time, hunting provides food, recreation, and a chance for millions of Americans to enjoy the outdoors each year.

Glossary

bag limits—The number of animals a hunter can legally harvest.
capture/recapture—A method of estimating population size used primarily with waterfowl and small mammals. This is done by marking a sample of the animals present in an area and then determining by recapture at a later date the fraction of the total population previously marked.
carrying capacity—The ability of a habitat to provide sufficient food, cover, and water determines the number of animals that can live in that habitat—its carrying capacity.
check station—A place where hunters bring animals to be recorded and examined by wildlife biologists.
cover or shelter—Refers to the vegetation and terrain available for reproduction, protection from predators, and shelter from inclement weather.
duck stamp—A special license necessary for hunting waterfowl. Revenues produced are used by Federal and State governments to buy habitat.
habitat—The place where an organism lives which provides it with food, shelter, and a place to reproduce.
overbrowse—To feed on the leaves, twigs, and shoots of trees or shrubs to the point of damaging the plants.
population estimate—Directly counting or indirectly sampling the number of individual animals of a specific species in a given area.
recreational or sport hunting—Hunting for recreation in accordance with hunting laws and bag limits. Sport hunters should not be confused with poachers who violate game laws and vandals who destroy property.
wildlife management—The protection, use, enhancement, reduction, elimination, or other manipulation of habitat and animal populations to maintain wildlife resources at their optimum level.
wildlife manager—Usually a professional wildlife biologist with expertise in the field of wildlife ecology and management. In this Pac the term is used in a general sense and includes a variety of personnel involved with the collection of wildlife data, i.e., conservation officers, refuge managers, biological technicians etc.
wildlife population—The number of a species in a specified area at a given time.



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Hunting and Wildlife Management

Activity 1 "Tagging" Wildlife

Purpose

Before wildlife can be managed properly, accurate information about species and habitats must be collected. In this Activity, students simulate one method used to make population estimates. They also analyze information obtained from the wildlife they "capture" in a game of tag and see how these activities parallel those actually used in wildlife management.

Learning Outcomes

After completing this Activity, students will be able to:

A. List three ways that population estimates can be made.

B. Give three examples of data that wildlife biologists obtain from marked animals.

C. Write a paragraph describing the role of hunting in wildlife data collection.

Organization

Who: Whole class (This Activity works best with at least 30 students.)

Where: Any open area or gymnasium

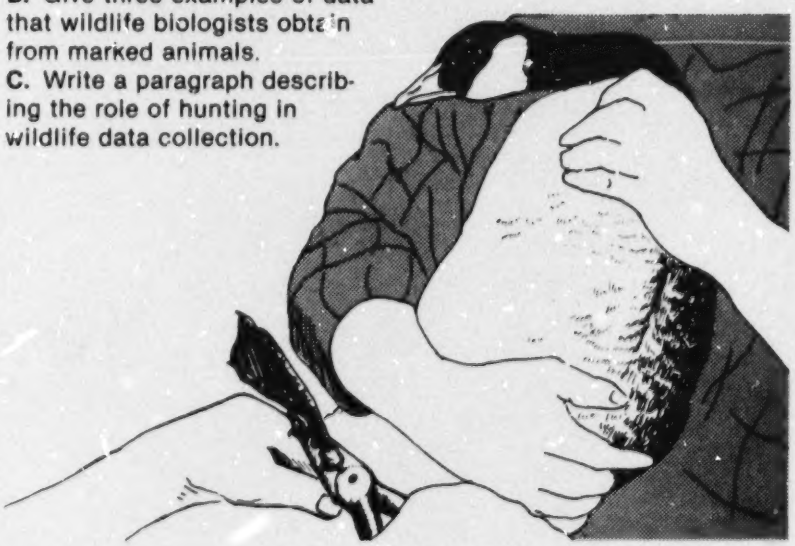
When: Any time of year

Time: One hour

Safety: Check area for hazards (rocks, holes, etc.) which might be encountered during an active game of tag.

Materials: For Each Student

- Pencil
- Data Sheet



Directions

1. Discuss with the class why wildlife managers would need to know wildlife species' population size, sex, age, health, and habitat needs. Bring up the idea of carrying capacity and discuss the effects of overpopulation on the condition of a habitat. Ask students how they might discover the number of animals in an area or the general health of these animals. The way a wildlife manager actually conducts this research in the field is usually determined by the type of animal, its behavior, and the type of habitat. For example, aerial surveys are used to estimate the population size of waterfowl, caribou, and antelope. Weight checks and analysis of the blood and tissue of deer for parasites can indicate a population's health. Banding (tagging and marking) is a common technique used to observe the migration patterns of geese. Tagging and marking are also used to study deer, bear, eagles, other species of birds, mammals, reptiles, and fish such as trout and salmon.

2. After the discussion, take the class outside or to a gymnasium. In this part of the Activity, students will simulate the population census technique of capture/recapture and will collect hypothetical data about a population of geese.

3. Step 1: The Marking. Play a game of tag. Have the "it" ("wildlife manager") capture about one half of the class. Captured "geese" leave the game area as they are caught and are "marked" by giving each an information band cut from a copy of the Data Sheet-Page 2.

4. Step 2: The Hunt. Hunters are an important source of information in wildlife research. In this part of the Activity, students will play the role of hunters and provide information to the "wildlife manager."

Hunt 1—Choose three students to act as hunters ("it") and play another game of tag. For this game, set rectangular boundaries and have all the "geese" (marked and unmarked) gather at one end. The hunters will wait in the center of the area. When the hunters tell the "geese" to migrate, all the "geese" must run from one end to the other. The hunters will try to "harvest" as many of the "geese" as possible before the students reach the other side. As the "geese" are harvested they should leave the game area. Each hunter has a bag limit of five "geese." Play the game with the "geese" migrating back and forth until the hunters have each caught five. At this time, the "hunters" should record under the Hunt 1 column on the Data Sheet the total number of "geese" taken (which should be 15) and the number of the captured "geese" who were previously marked. (**Note:** If you have an unusually large group playing, you should add more "hunters" so that if each "hunter" harvests five "geese," approximately half the class will have been taken.)

Hunts 2 and 3—Play the game twice more with the entire class. To get new hunters, have the "hunters" from the previous game choose one of the "geese" they captured. If any of the new "hunters" have information bands from the first game, they should exchange them with the "hunters" that chose them. The rest of the marked "geese" should keep their cards. Data should be recorded in the appropriate spaces on the Data Sheet as was done for Hunt 1. After the games, have the original "wildlife manager" gather all the information bands used by the class. They should be placed in a file for the students to use over the next few days.

5. In class, using the data collected, have the students work with the Data Sheet - Page 1 to calculate an estimate of the total population. This number should be approximately equal to the class size.

6. Next, divide the class into four working groups. Have each group work with the file of bands to complete the following activities. (**Note:** if you want to have the entire class work with the bands at the same time, you can just photocopy the Data Sheet three more times.)

a. How old were the birds? The bands are all marked juvenile. This means the birds were all less than one year old when banded. The students can subtract the date the birds were banded from the present date to get the bird's age. The average age and longest-lived bird can also be computed.

b. Have the students plot on a map the original banding location for each bird.

c. Have the students graph the month of the year the birds were banded.

d. After the above computations are done, have one group compare the month the birds were banded with the location of the banding. From this information, the students should be able to determine that the birds winter on the Gulf Coast and nest in Saskatchewan.

7. To conclude the Activity, discuss the role of hunting as a source of information for this Activity and for actual wildlife managers. Explain that this exercise was just one example of many types of wildlife data collection. Reemphasize the importance of accurate data to wildlife management for the benefit of people and wildlife.

Activity Review Answers

1. Several answers are possible for each. The most commonly used are given. **a.** An estimate can be made by direct observation along the migration route. **b.** Aerial surveys or surveys of nesting areas. **c.** An estimate of squirrels in a small area can be made using the capture/recapture method.

2. No. This method has been used on Canada geese, but generally it works best when the animal whose numbers are being estimated spend most of their time in a relatively small area.

3. 3-**a**; 1-**b**; 4-**c**; 2-**d**; 5-**e**.

4. False. The capture/recapture technique is important, but it's only one of several methods.

5. Biologists can get a variety of information depending on the type of band and the nature of the research being done. Common types of information are: age of the animal; sex of the animal; species of the animal; location of original banding; and location of band recovery.

Hunting and Wildlife Management

Activity 1

Activity Review

Name:

1. How might wildlife biologists estimate the size of:

a. A herd of migrating caribou? _____

_____

b. Waterfowl populations? _____

_____

c. A population of squirrels that live in a small park forest? _____

_____

2. Is the capture/recapture technique a good method to use for estimting populations of migrating geese? _____ Explain your answer. _____

_____

_____

_____

3. Number these facts in the order in which they might occur.

_____ a. A wildlife manager traps 100 rabbits; 30 have been marked and 70 are unmarked.

_____ b. A wildlife manager wants to know how many rabbits are in a habitat.

_____ c. A wildlife manager determines there are about 333 rabbits in the habitat.

_____ d. A wildlife manager traps and marks 100 rabbits and releases them.

_____ e. A wildlife manager decides whether to permit hunting or change the bag limit.

4. The capture/recapture technique is the main method used by biologists to measure population size. True or False? _____

5. List three types of information that biologists can get by analyzing bands that are returned.

a. _____

b. _____

c. _____

Hunting and Wildlife Management

Activity 2 — Habitat Game

Purpose

In order to survive, animals need sufficient food, water, and shelter (cover). In this Activity, students discover how wildlife populations fluctuate with the availability of these natural elements.

Learning Outcomes

After completing this Activity, students will be able to:

A. List three natural elements that wildlife needs to survive.

B. Graph changes in the size of a wildlife population over a ten-year period.

C. Write a paragraph on the role that predators play in a natural ecosystem.

Organization

Who: Whole class (This Activity works best with at least 30 students.)

Where: Large outdoor play area or activity room

When: Any time of year

Time: One and a half hours

Safety: Check area for hazards (rocks, holes, etc.) which may be encountered when the students run.

Materials: For the Class

- String or chalk to make the lions' den

Materials: For Each Student

- Data Sheet
- Pencil

Directions

1. In this game the students assume the roles of food, water, shelter, deer, and mountain lions to see how these elements interact in nature. Discuss what basic elements they feel wildlife needs to survive (food, water, shelter). Then explain that the students will play a game to see how these factors interact.

2. Choose one student to be the scorekeeper during the games. This student will use one of the Data Sheets to keep track of the number of deer and mountain lions at the end of each game.

3. Divide the remaining students into two equal groups. Once outside, line the groups up facing each other or opposite sides of the play area. Explain that those on one side will be **deer,** and those on the opposite side will be **deer habitat.**

4. Ask the students to decide whether they want to be food, water, or shelter. The students indicate what they are by making the following signs:
Food—hands on stomach;
Water—hands on mouth;
Shelter—hands on top of head.
Have the students practice their gestures. (**Note:** Once the game has begun, students must not change their signs.)

5. Have both lines (representing deer and deer habitat) face away from each other with their backs to the play area. On the command, "make your sign," everyone gestures. The deer signal that they want food, water, or shelter, the members of the habitat indicate what they will provide by making the sign for food, shelter, or water. On the second command, "deer go home," both lines turn to face each other, and the deer run across to the habitat line to find someone making the same sign. Those who want water (hands on mouth) are looking for someone in the habitat to provide them with water; hungry deer look for food (hands on stomach); and the deer looking for shelter search for students with hands on their head. Deer should only capture one habitat person each game.

6. Deer who have found what they needed in the habitat now return to their side of the play area and take captured habitat students with them. These students now become deer, representing the natural increase in deer population when adequate wildlife habitat is available. Those deer that can't find someone making their sign must remain on the habitat side. They have "died" and become part of the environment.

7. After the deer "go home" several times, their numbers will increase. Now select two students to play the part of "mountain lions." A circle is drawn in the center of the play area. This is the "lions' den." The scorekeeper should also keep count of mountain lions.

Now when the deer are commanded to "go home," each lion will try to "attack" one deer and bring it back to the den. The lion "attacks" and catches a deer by tagging it before the deer tags a habitat student. If the lion is successful, the deer becomes a lion. Unsuccessful lions "die" and become a part of the environment. These new additions to the "habitat" should adopt one of the three signals for subsequent games. Each game is considered an entire year in the life of the deer. The Data Sheet provides space to record the results of ten games.

8. Back in the classroom, pass out the Data Sheets and have each student record the numbers that the scorekeeper wrote down during the game. Have each student graph the population changes of both deer and mountain lions.

9. Note: As with most educational games, the effectiveness of the Habitat Game as an educational device depends on the followup discussions. The following questions can help the students see some key concepts of ecology and wildlife management. Although the game situation is highly artificial, the resulting data will closely parallel what happens in a natural ecosystem.

a. When did the number of deer increase? (When there was plenty of food, water, and shelter.)

b. When did the deer population decrease? (After the availability of food, water, and shelter decreased because of the increased size of the deer herd.)

c. Did the lions control the size of the deer herd? (No, it's really the other way around. When there are plenty of deer, the lions can find prey easily and they begin to increase. When deer are scarce, the lion population begins to fall). Note that on the graphs, the build-up and decline of the lion and deer populations do not occur together. Peaks in the deer population match lows in the lion population since the lions respond to the large number of deer by producing more lions the next year. (**Note:** This is necessarily an over-simplified version of predator/prey relationships. There is still much uncertainty and some controversy surrounding this complex subject.)

d. Are widely fluctuating deer populations common in nature? (To a certain extent, yes. However, in many cases the population swings are made more drastic by factors such as the return of farmland to brush and forest or the conversion of forests to farms and cities that have occurred in many areas of the U.S. This creates favorable or unfavorable habitat and the deer population increases or decreases quickly.)

e. Can hunters replace the mountain lions and other large predators and thus control the size of deer herds? (As we have seen, predators don't really control the prey—just the opposite. However, sufficient hunting pressure can control population swings by consistently removing the surplus animals each fall and winter.)

Activity Review Answers

1. Three necessary elements are food, water, and shelter.
2. False. The prey controls the predator populations. When there are plenty of prey animals, predators find sufficient food and increase in numbers. When prey are scarce the predator population decreases.
3. When sufficient food, water, or shelter are not available for the deer population, many deer will die. Disease can also cause population decreases.
4. No. Peaks in the deer population matched lows in the lion population. Lions responded favorably to the large number of deer and produced more young the following year.
5. False. Wildlife populations fluctuate based on available habitat (food, shelter, water).

Name:

1. List three natural elements necessary for wildlife survival.

a. _____

b. _____

c. _____

2. Predators (mountain lions, etc.) control the size of the prey population (deer, etc.). True or False? _____

3. Give one reason for drastic population decrease of a deer herd. _____

_____

_____

_____

_____

4. On the graph you plotted after the game, did the deer and mountain lion populations increase at the same time? Why or why not?

_____

_____

_____

_____

5. Wildlife populations are usually very stable. For instance, the number of deer in an area usually doesn't change much from year to year. True or False? _____

Hunting and Wildlife Management

Activity 3 — Deer Management

Purpose

Because of human intervention with wildlife species and habitats, some species must be actively managed to achieve stable and healthy populations. In this Activity, students develop a management plan to handle deer overpopulation.

Learning Outcomes

After completing this Activity, students will be able to:

A. List three reasons why people manage deer populations.

B. List three strategies that might be used in deer management.

C. Write a one-page report discussing the advantages and disadvantages of various wildlife population management techniques.

Organization

Who: Individual students, and groups of four or five
Where: Indoors
When: Any time of year
Time: Two to three hours

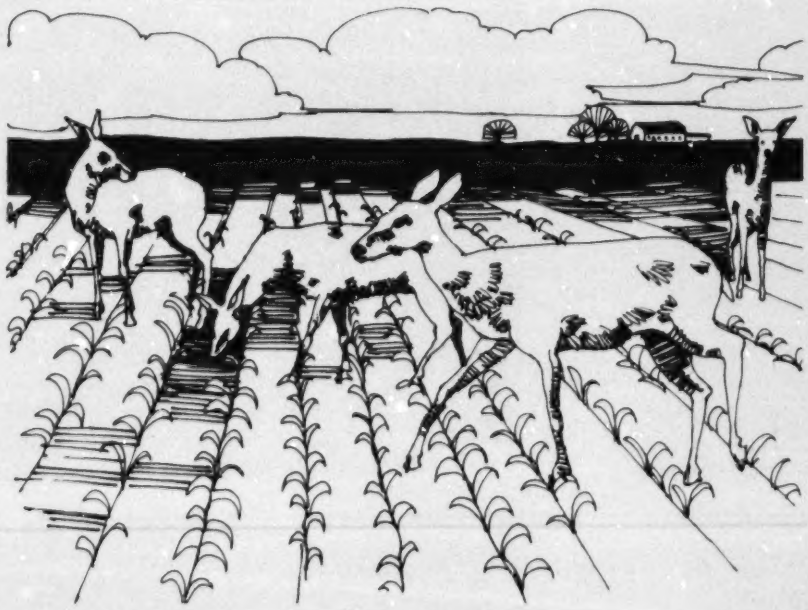
Materials: For Each Student

- Data Sheets
- Pencil
- Paper

Directions

1. In this Activity, students will be asked to design a one-year management plan for an expanding deer herd. Explain this goal to the class, pointing out the effects of overpopulation on habitat and species. Overpopulation leads to damage of habitat as herds of deer overbrowse an area. More deer means less food for each individual. This can result in malnutrition, starvation, disease, and infestation by parasites. Overpopulation also causes increased deer/vehicle collisions and higher crop damage to nearby farmlands. To prevent these and other problems, people must manage deer herds to control their populations.

2. Having established the need for management, briefly discuss methods of population control. Hand out the Data Sheets and tell the class they are managers in charge of a wildlife refuge with an expanding deer herd. Their goal is to control deer numbers over a one-year period, working within a limited budget. They may use one method or combine methods to achieve their goal.



3. Discuss the following management methods with the class, making sure they understand the costs, benefits, and effects of each. (**Note**: All costs are rough estimates, but are stated as precise figures to make the game easier.)

a. Expand Habitat. A plot of land near the refuge is for sale. It will cost $50,000 and will support 50 more deer. This is a way to increase the carrying capacity of the refuge by 50 deer, but what will happen when the herd expands in subsequent years?

b. Improve Habitat. The quality of refuge habitat can be improved by planting shrubs which provide good food and cover for wildlife. For $50,000, 100 deer can be accommodated. For $80,000, 120 deer can be accommodated. For $90,000, 130 deer can be accommodated. This method has the advantage of improving conditions for a wide variety of animals besides deer, but the carrying capacity of the refuge can only be improved to a certain point. Once this optimum carrying capacity is reached, spending more money will have little positive effect.

c. Live Trapping and Relocating Deer. The refuge manager can trap and move deer to another area. However, it costs $600 per deer to catch and move them and few places are available where the deer can be relocated.

d. Professional Removal. Done by hiring an expert to shoot or trap the surplus deer. The professional would charge $150 for each deer removed.

e. Supplemental Feeding. Corn can be bought to support the deer population. The necessary feed will cost $300 per deer. What will happen if the manager had to stop feeding in the winter? When there are more deer born in the spring, what will happen the following winter? Is supplemental feeding a permanent solution to the problem?

f. Sterilization and Introduction of Predators. So far, no practical methods have been found to sterilize large numbers of deer. Also, as was demonstrated in Activity 2, predators such as wolves and mountain lions don't really control deer populations. Predator populations tend to follow the ups and downs of the deer herd, not cause them. Besides, what would be people's reaction when the wolves start to kill pets and livestock of nearby farms and communities? (**Note:** This option is not included on student Data Sheets, but should be brought out in class discussion.)

g. Recreational Hunting. Hunters can be allowed to remove the surplus deer populations. It will cost the refuge $20,000 each year to run the hunter education program and to do patrols and law enforcement work during the hunting season to make sure the laws and hunt rules are observed. At $20,000 the cost to remove 200 deer would be $100/deer. (**Note:** The hunters will actually return a major share of the $20,000 through the purchase of hunting licenses and tags. However, this money would not be paid directly to the refuge in most cases and is not considered as part of this game.)

4. Have each student devise a management plan for their deer herd, using information on the Data Sheet. Give the class 30 minutes to develop their plans.

5. When the students have completed their plans, divide the class into groups of four or five to discuss and pick the most effective plan in the group.Tell them they can combine plans to come up with one best plan. Give the class about a half an hour to do so.
6. Have each group write up and present its plan to the class. Follow up the Activity by discussing the number of combinations, strategies, and options available in wildlife management. Stress that there is no one right answer and that some solutions and options might not work depending on the area, time limits, species to be managed, and resources available to the managers. For instance, expansion of habitat may be limited by surrounding development. Live trapping and removal is usually not a practical solution when managing large animals.

Followup

Have students find newspaper articles and talk to a wildlife manager about actual instances of deer management in their particular area. Have them compare these cases to their own hypothetical management plans. Have students note the budget and other factors influencing decisions and list these.

Activity Review Answers

1. The following are some ways to reduce deer populations: allow hunting; live trap and remove deer to other areas; hire biologists to professionally remove deer (by hunting, etc.).
2. Overpopulation can lead to starvation, disease, infestation by parasites, weakening of individuals, etc., because there is less food, water, and cover available for animals.
3. **a, c, d.**
4. There may not be enough land available to offset the population growth. More space does not solve the cause of overpopulation; it only treats the symptom. Also, undeveloped land is growing increasingly scarce, and one responsibility of wildlife management is to manage wildlife within the restrictions of money, time, and land available.

Name:

1. Name three possible ways of reducing the size of an overpopulated deer herd.

a. _____

_____

b. _____

_____

c. _____

_____

2. Why should wildlife populations be managed if there are too many of one species in a given area? List three reasons.

a. _____

_____

b. _____

_____

c. _____

_____

3. If you were a wildlife manager deciding on a plan to solve an overpopulation problem, what would be three factors you would consider in making your plan? Check the three most important factors below.

_____ **a.** Amount of money in your budget.
_____ **b.** Number of hunters in your area.
_____ **c.** Length of time you have to reduce your population.
_____ **d.** Costs of individual techniques.
_____ **e.** Amount of land paid for by license fees.

4. List two reasons why buying more land may not solve an overpopulation problem.

a. _____

_____

_____

b. _____

_____

_____

Name:

Use the four grids below to figure out your deer management plan. Pick options from Data Sheet-Page 1 and write the numbers of the options chosen in the spaces provided. For example, if you pick Option #1, "expand habitat," write "1" in the top blank space of the left column. Fill in the other blanks of the grids with the amount of money for that option and the number of deer managed by that option. When you have finished listing your options (and you do not have to pick five, but can use one or two or as many as you like), total the columns to see how much of the budget has been used and if you have managed the necessary number of deer. The first two grids are for practice. Use the third grid to develop your individual plan and the fourth for your group plan.

Practice Grid #1

Option(s) Chosen	Amount of Budget Used	Number of Deer Managed
Option #_____		
Option #_____		
Option #_____		
Option #_____		
Option #_____		
TOTALS:	$	

Practice Grid #2

Option(s) Chosen	Amount of Budget Used	Number of Deer Managed
Option #_____		
Option #_____		
Option #_____		
Option #_____		
Option #_____		
TOTALS:	$	

Grid #3 (Your Plan)

Option(s) Chosen	Amount of Budget Used	Number of Deer Managed
Option #_____		
Option #_____		
Option #_____		
Option #_____		
Option #_____		
TOTALS:	$	

Grid #4 (Group Plan)

Option(s) Chosen	Amount of Budget Used	Number of Deer Managed
Option #_____		
Option #_____		
Option #_____		
Option #_____		
Option #_____		
TOTALS:	$	

Hunting and Wildlife Management

Activity 3

Data Sheet

Name:

Deer Management Options

You are the manager of a wildlife refuge. There is a herd of 200 deer on the refuge. This herd will expand at the rate of 200 deer per year. The refuge can support only 200 deer. Since the carrying capacity has been reached, the rates of disease and starvation are increasing. Farms surround the area and more deer are beginning to forage on these private lands in search of food. Listed below are several ways to control the deer population. However, there is only $100,000 available to spend. Devise a plan to manage the 200 surplus deer over the next year. Choose options, add the total costs, and stay within the $100,000 budget.

1. **Expand Habitat.** You can buy a plot of land for $50,000 which will support 50 deer.

2. **Improve Habitat.** You can improve the habitat by planting shrubs to provide food and cover. For $50,000, you can accommodate 100 deer; $80,000 will provide for 120 deer; and $90,000 will provide for 130.

3. **Live Trapping and Relocating Deer.** It costs $600 per deer to catch and move it to another area.

4. **Professional Removal.** You can hire a professional hunter at $150 per deer.

5. **Supplemental Feeding.** Corn can be bought to support population. Cost is $300 per deer.

6. **Recreational Hunting.** Hunters can be licensed to remove the surplus deer. Hunter education and law enforcement costs $20,000 each year or $100 per deer.

Hunting and Wildlife Mangement

Activity 2

Data Sheet

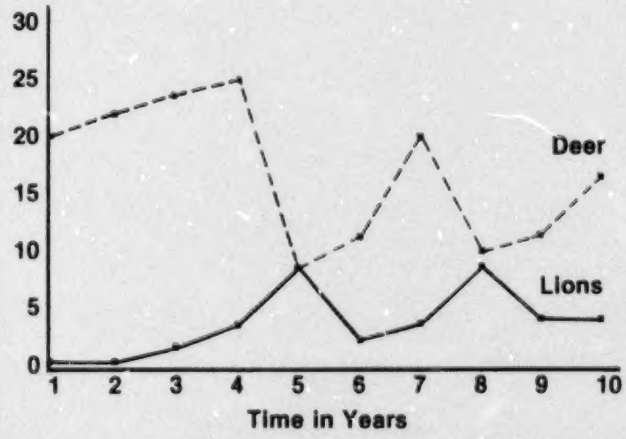
Name:

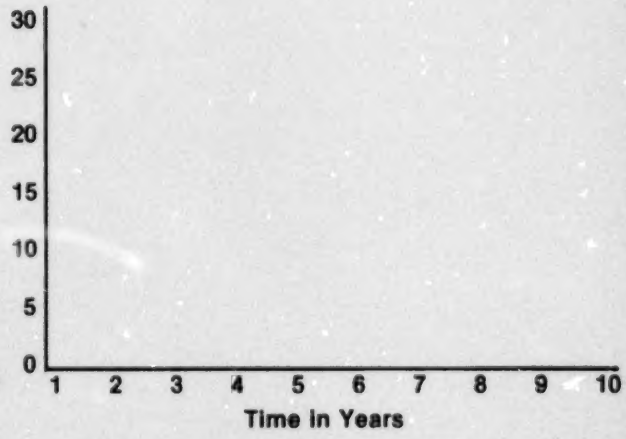
Sample

GAME #	DEER	MOUNTAIN LIONS
START	15	0
1	20	0
2	22	0
3	23	2
4	24	4
5	8	8
6	12	2
7	20	4
8	10	8
9	12	4
10	16	4

GAME #	DEER	MOUNTAIN LIONS
START		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Sample





Name:

Copy and cut along lines to make information bands.

Information Bands

Species: Canada goose
Age: Juvenile
Sex: Female
Date Banded: 12/3/78
Place Banded: Galveston, Texas

Species: Canada goose
Age: Juvenile
Sex: Male
Date Banded: 4/6/73
Place Banded: Pelican Narrows, Saskatchewan

Species: Canada goose
Age: Juvenile
Sex: Male
Date Banded: 6/19/74
Place Banded: Dore Lake, Saskatchewan

Species: Canada goose
Age: Juvenile
Sex: Female
Date Banded: 11/9/76
Place Banded: Johnson's Bayou, Louisiana

Species: Canada goose
Age: Juvenile
Sex: Female
Date Banded: 2/11/72
Place Banded: Baytown, Texas

Species: Canada goose
Age: Juvenile
Sex: Male
Date Banded: 8/7/73
Place Banded: White Fox, Saskatchewan

Species: Canada goose
Age: Juvenile
Sex: Male
Date Banded: 7/7/77
Place Banded: La Ronge, Saskatchewan

Species: Canada goose
Age: Juvenile
Sex: Female
Date Banded: 1/20/75
Place Banded: Grand Lake, Louisiana

Hunting and Wildlife Management Calculation Sheet

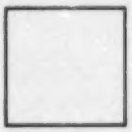
Activity 1

Data Sheet

Name:

Place data in the different shapes below and work the equations as shown.

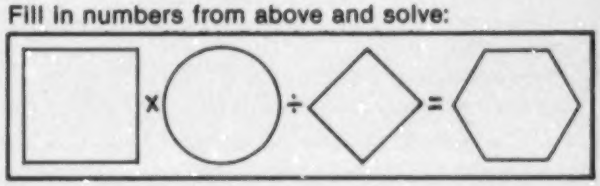
Step 1: The Marking
Total number of "geese" marked:



Step 2: The Hunt
Hunt 1:
Total number of "geese" taken:

Number of marked "geese" taken:

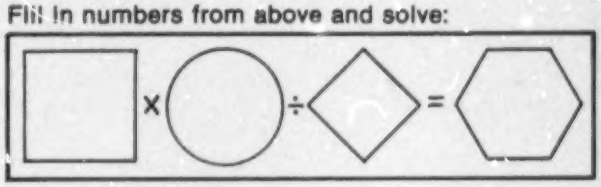
Fill in numbers from above and solve:



Hunt 2:
Total number of "geese" taken:

Number of marked "geese" taken:

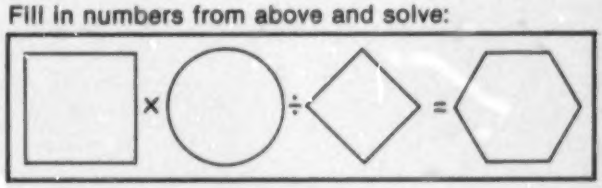
Fill in numbers from above and solve:



Hunt 3:
Total number of "geese" taken:

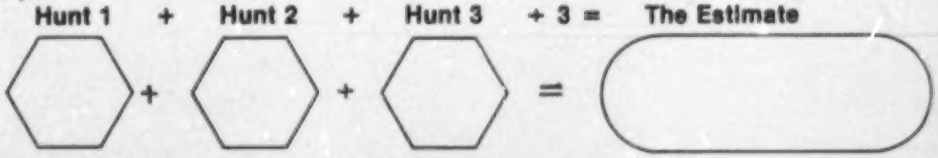
Number of marked "geese" taken:

Fill in numbers from above and solve:



Step 3: The Estimate
To get final population estimate fill in hexagons with answers from above and divide by 3:

Hunt 1 + **Hunt 2** + **Hunt 3** + 3 = **The Estimate**



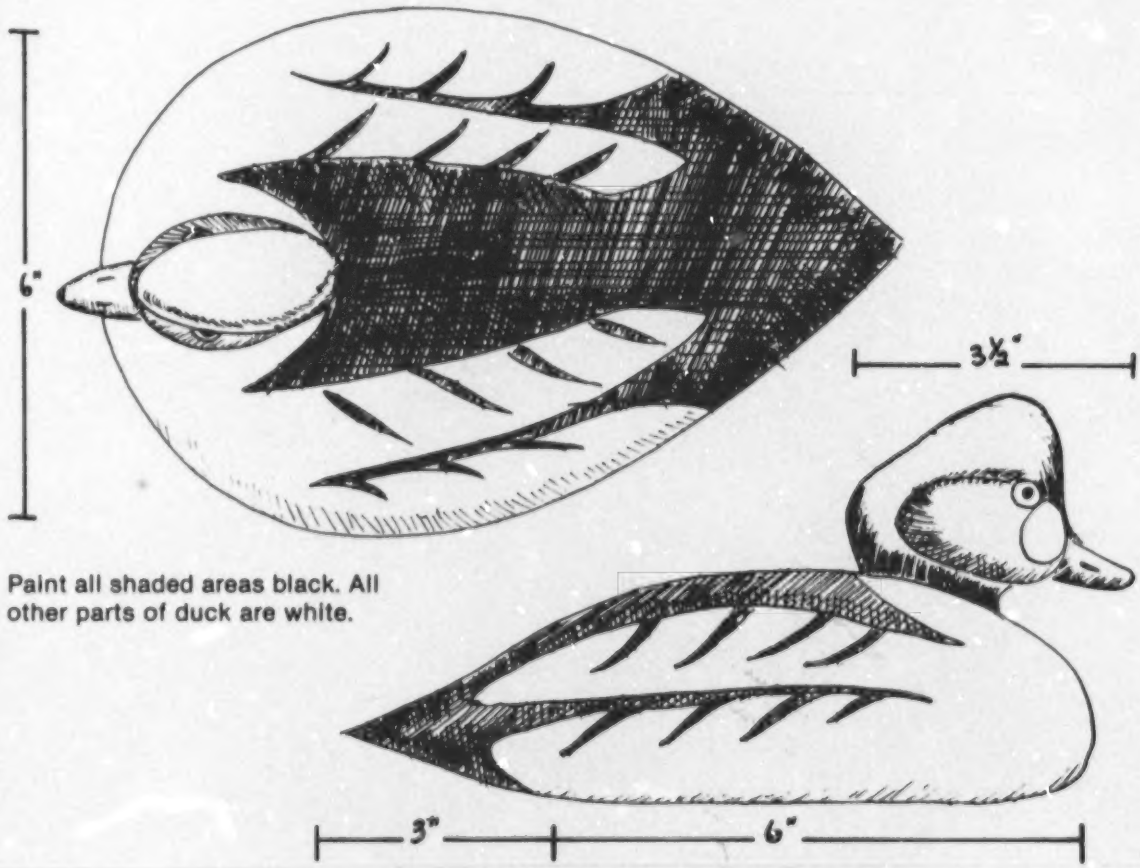
Name:

Many hunters use decoys to attract their quarry. Duck decoys are made of many materials; here you will make one out of papier-mache.

Materials:

bowl (6" round plastic, to use as model for duck's body)
pipecleaners
3 cups flour
1 ½ cups water
newspaper
paints
varnish
stapler or glue

Tear newspaper into lots of thin strips. Mix flour and water to form a sticky paste. Soak several strips of paper in paste mixture and begin building up your duck's body, as shown in the illustration. When body is complete, let dry. Glue or staple pipecleaners to serve as base for duck's head and tail. When these are in place, begin soaking and pasting more newspaper around them to build them up. When duck is finished, let dry overnight. Paint duck. Seal colors, when dry, with varnish.



Paint all shaded areas black. All other parts of duck are white.

Common Goldeneye — drake

There are some really delicious recipes for preparing game animals for the table. The recipe below is for braised rabbit, but you could also substitute pheasant, squirrel, or other small game. Whatever you use, the result is the same: a very tasty meal.

INGREDIENTS

1 medium-sized rabbit (or other game meat)
4 tablespoons shortening
1 cup milk
3 stalks of chopped celery
1 chopped green pepper
3 sprigs of chopped parsley
1 bay leaf
1 ½ teaspoons salt
Dash of pepper
½ cup flour
½ cup bread or cracker crumbs

1. Clean and cut meat into serving size pieces. Roll in flour.
2. Mix ½ cup of flour, ½ cup of bread crumbs (or cracker meal), salt, and pepper.
3. Dip each piece in ½ cup of milk. Then dip each piece in bread crumb mixture.
4. Using a deep baking pan, fry meat until golden brown.
5. Add celery, green pepper, parsley, bay leaf, and remaining milk.
6. Remove baking pan from burner, and place in oven. Bake at 275° until tender (about one and a half hours). Serve with rice (white, brown, or wild) and fresh vegetables.

The Federal Aid In Wildlife Restoration Act
The Pittman-Robertson Program

Fact Sheet

In the early 1930s, wildlife, like the economy, was having a difficult time. Wildlife populations in much of the country were seriously depleted, and a major drought greatly reduced the quality of wildlife habitat over a broad area. During this period, the Federal Government bought and developed several million acres of land to provide habitat for ducks and geese. When conservationists saw wildlife populations increase as the habitat was restored, they urged Congress to authorize additional money so more land could be purchased and developed.

An excise tax on rifles, shotguns, and ammunition had been collected since 1932 but it was treated as a general tax and was not reserved for any particular purpose. In 1937, when Congress was considering abolishing this tax, conservationists requested that it be retained and used for wildlife restoration. The idea was so popular that the Federal Aid in Wildlife Restoration Act passed through Congress with no opposition. The legislation was sponsored by Senator Key Pittman of Nevada and Representative A. Willis Robertson of Virginia and is popularly known as the Pittman-Robertson Act.

According to the Act, an 11 percent tax is collected from the manufacturers of firearms and ammunition by the Department of the Treasury. A recent amendment allows excise taxes to be collected from the sale of pistols and archery equipment as well. A State may use up to one-half of this additional amount for hunter safety education. Through the years, the excise tax on sporting equipment has provided more than one billion dollars. In 1981 alone, over 100 million dollars were collected for wildlife conservation. This tax is transferred annually to a special fund administered by the U.S. Fish and Wildlife Service. Wildlife restoration funds are divided among the States based on the number of licensed hunters and the size of each State; no State can receive more than five percent or less than one-half of one percent of the total. Hunter safety education funds are based on population with no State receiving more than three percent or less than one percent of these funds.

While providing financial assistance, the Act requires the Federal Government and States to work together for the conservation and restoration of wildlife. Before a State could become eligible to receive

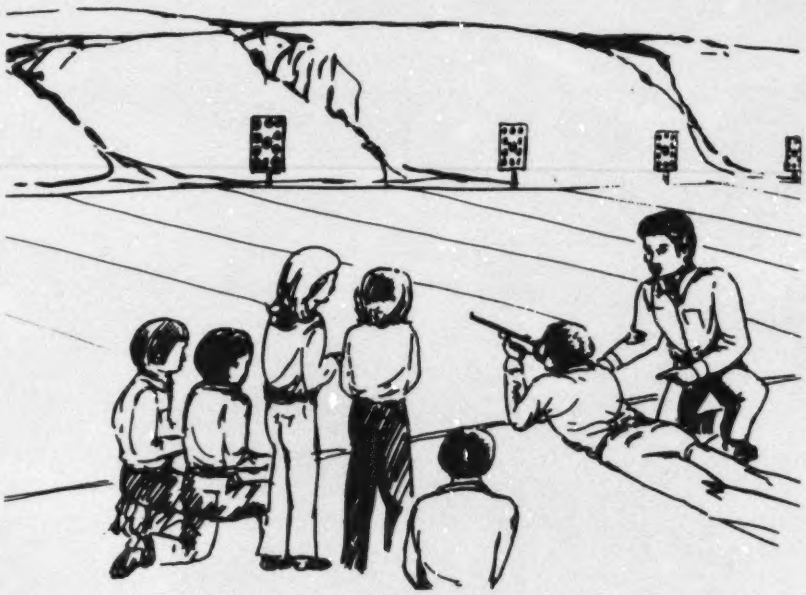
Pittman-Robertson funds, it was required to pass laws for the conservation of wildlife. In addition the State had to agree to use money received from the sale of hunting licenses for no purpose other than operation of the State fish and wildlife management agency. By 1947 all States had an active Pittman-Robertson program.

How the Program Works

The U.S. Fish and Wildlife Service prepares a notice each year which informs the States how much money they may receive from the program. At the same time, each State prepares proposals for the wildlife management projects that it has determined to be most important. After the Fish and Wildlife Service reviews these proposals and finds that they conform with Federal standards, they are approved, and the State may start the projects. As the projects progress, the State is reimbursed by the Federal Government for up to 75 percent of the cost.

How the Money is Spent

More than 62 percent of the money available to the States is used to purchase, develop, maintain, and operate wildlife management areas. Since the program began, 3,700,000 acres have been purchased for wildlife. This is an area larger than the State of Connecticut. The purpose of these areas is to provide wildlife habitat and the opportunity for people to enjoy wildlife related recreation. Some of these projects involve complex engineering, such as impounding water for marsh or wetland habitat, but often they involve agricultural operations which produce diverse plant communities favorable to wildlife. In the dry parts of the western United States, constructing windmills and water tanks and providing other water sources allow many species of wildlife to thrive in an otherwise hostile environment.



About 26 percent of the money provided to the States is used for research or surveys. Many detailed, scientific investigations into the problems affecting wildlife populations are accomplished each year. This research usually involves long periods of time and is designed to provide new information that can be used in managing wildlife or wildlife habitat. Surveys are conducted to determine the condition and numbers of animals or the condition and amount of wildlife habitat at a particular time. This information is used by wildlife professionals to determine proper management of wildlife populations.

More than seven percent of the money is used by the States to fund hunter safety education programs. These programs for beginning hunters teach safe handling of firearms and archery equipment, respect for wildlife, ethical behavior while hunting, and the avoidance of accidents associated with hunting. About 700,000 students are trained by the fish and wildlife agencies each year.

The remaining five percent is used by the States to plan and supervise the Federal Aid program and to provide technical information to other government agencies.

What Wildlife is Benefited

Most management practices have been directed toward big game, small game, furbearing mammals, and waterfowl because 75 percent of all funding for fish and wildlife agencies comes from the sporting public. Sport hunting is an important economic industry amounting to about 10 billion dollars a year. However, in the last 20 years, wildlife managers have increasingly emphasized management of habitat for all species, game and non-game. Because Pittman-Robertson funds may be used to manage any species of wild bird or mammal, the States may use these funds where the need exists.

Loss of habitat resulting from highway construction, urban sprawl, wetland drainage, environmental pollution, and other environmental changes caused by the rapidly increasing number of people affect non-game animals as well as game animals. Therefore, any habitat acquisition, development, or protection to benefit game animals provides habitat for many more non-game animals.

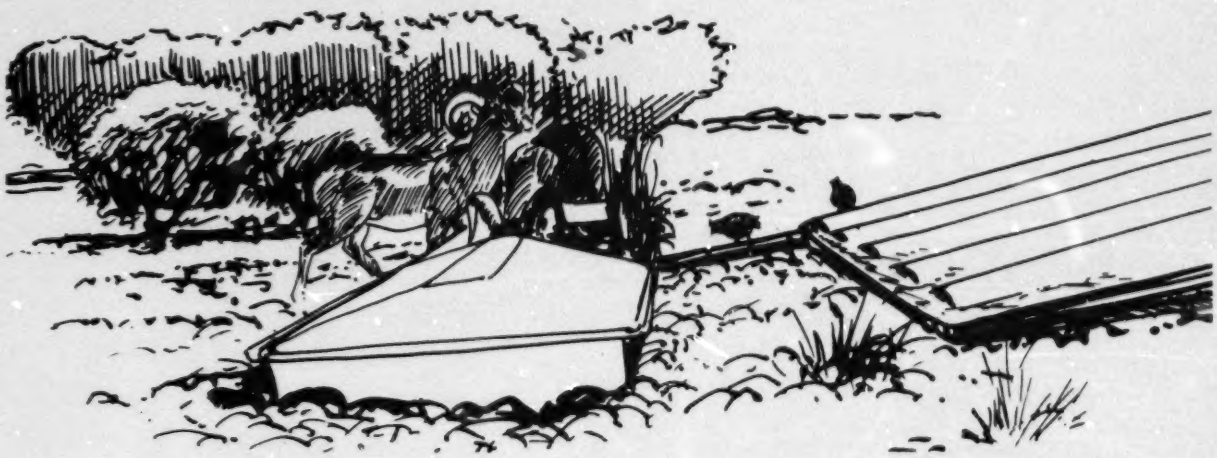
For example, shrubs planted to provide cover for pheasants and rabbits also provide excellent cover for many songbirds. Waterfowl management areas provide ideal habitat for egrets, herons, and many other species of marsh-loving animals which are not hunted.

Aside from the indirect effects of game oriented programs, Pittman-Robertson funds have financed research into the needs of many endangered species and other non-game species. Animals such as the eastern timber wolf, red wolf, prairie dog, Kaibab squirrel, black-footed ferret, and red-cockaded woodpecker have been studied either directly or as they relate to other species. There is a growing trend for States to direct Pittman-Robertson funds to non-game animals, particularly when the public indicates a strong interest in a particular species.

Species of wildlife that are hunted are monitored very closely using funds from the Pittman-Robertson program to ensure that the number of animals is in balance with the habitat. By professional wildlife management, the public may be assured that sport hunting will not cause the extinction of any species of wildlife. In fact, because of the attention game animals receive from wildlife managers, most are more numerous than they were 50 years ago.

Who Benefits from the Pittman-Robertson Program

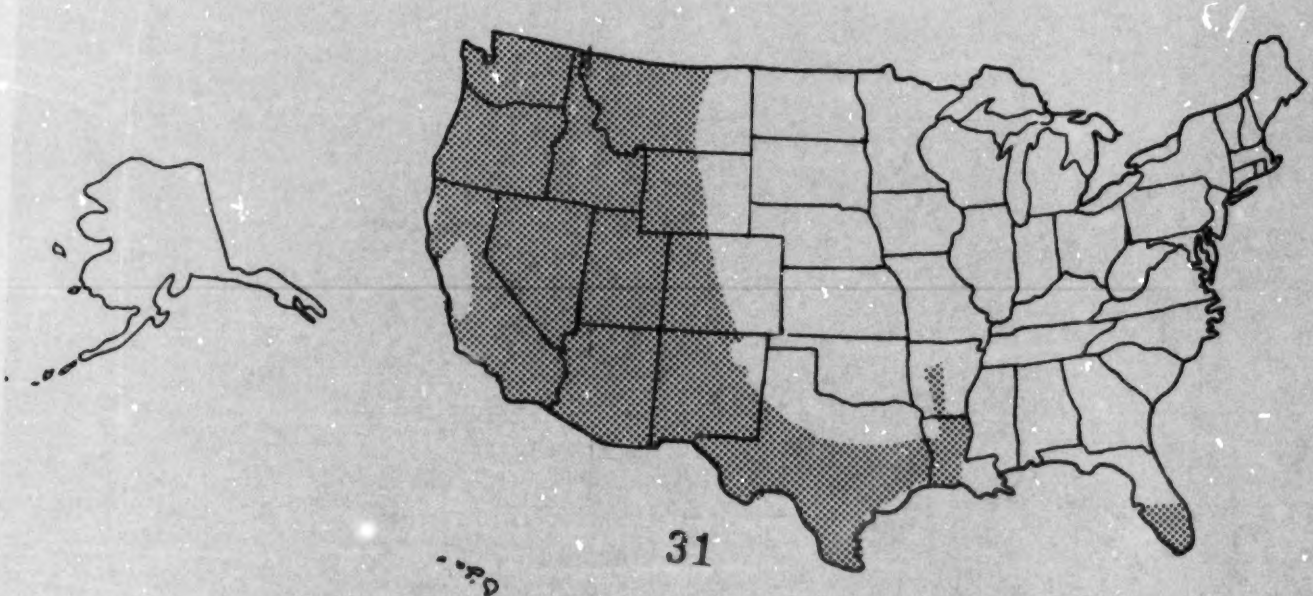
A national survey conducted in 1975 showed that about half of the 184 million people over nine years of age living in the United States engaged in recreation that they considered to be wildlife related. More than 20 million were hunters. The American people have a great love for wildlife and value the enjoyment that they receive from wildlife oriented recreation. Surveys conducted on wildlife management areas developed by the Pittman-Robertson program affirm this expression of public interest. About 30 percent of the people visiting these areas are hunters; the remaining 70 percent are bird-watchers, nature photographers, artists, picnickers, canoeists, and other people who enjoy seeing wildlife in its natural habitat.



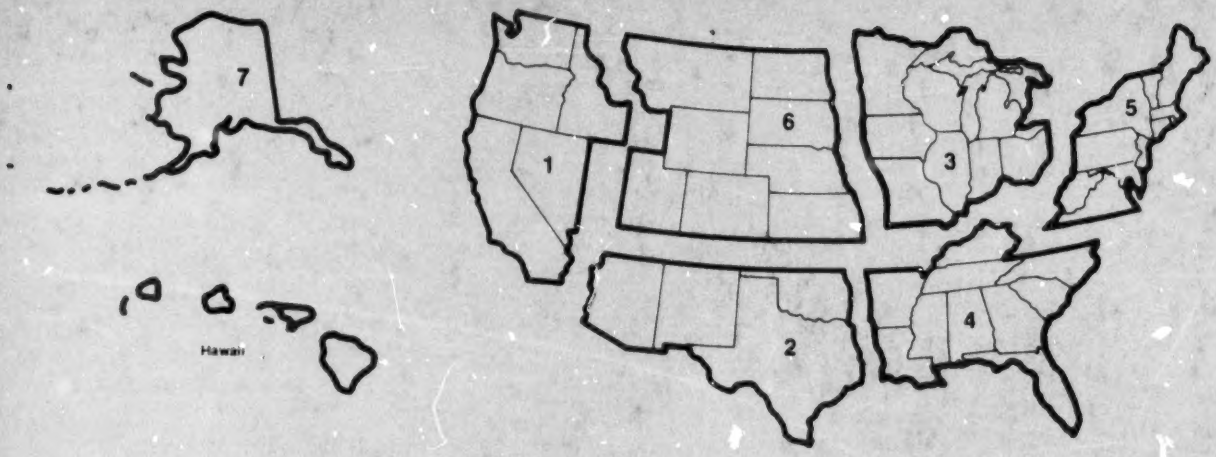
Ranges of deer and mountain lion in the United States

Range of mountain lions

White-tail and mule deer are found everywhere in the U.S. except Hawaii.



U.S. Fish and Wildlife Service Regions



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U.S. Fish and Wildlife Service

National Institute for Urban Wildlife

10921 Trotting Ridge Way Columbia, Maryland 21044

The mission of the National Institute for Urban Wildlife is to be a responsible and effective scientific and educational organization advocating the enhancement of urban wildlife values and habitat and the wise use of all natural resources for the benefit of people in cities, suburbs, and developing areas.

The Institute is the only private national conservation organization with programs dealing almost exclusively with fish and wildlife in urban and other disturbed areas. Funded through private and corporate contributions, grants and contracts, it is filling some of the glaring gaps in information and methodologies needed for the management and enjoyment of wildlife and wildlife habitats in urban areas.

The Institute accomplishes its mission by (1) conducting sound research on the relationship between man and wildlife under urban and urbanizing conditions; (2) discovering and disseminating practical procedures for maintaining, enhancing or controlling certain wildlife species in urban areas; and (3) by building an appreciation for, and understanding of, wildlife and a positive conservation ethic at the local community and neighborhood level, and illustrating how all segments of our people have a vested interest in wildlife and the environment we mutually share.

Developed by the U.S. FISH AND WILDLIFE SERVICE/DEPARTMENT OF INTERIOR
Produced by the NATIONAL INSTITUTE FOR URBAN WILDLIFE

Contents printed at no expense to the Federal Government.